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भाग 2 संयोजन कॉर्क — परीक्षण विधियाँ

Indian Standard

GASKETS AND PACKINGS

PART 2 COMPOSITION CORK — TEST METHODS

ICS 23.040.80

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1998

Price Group 2

Gaskets and Packings Sectional Committee, LM 19

FOREWORD

This Indian Standard (Part 2) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gaskets and Packings Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

In the prepartion of this standard necessary assistance has been derived from ISO 4708 : 1985 'Cork — Composition cork gasket material — Test methods', published by the International Organization for Standardization (ISO).

This Indian Standard has been published in two parts:

Part 1 Composition cork — Specification

Part 2 Composition cork — Test methods

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GASKETS AND PACKINGS

PART 2 COMPOSITION CORK — TEST METHODS

1 SCOPE

This standard (Part 2) specifies the test methods to be used for the determination of the physical properties of the composition cork material intended to be used as gasket in engineering industries.

2 APPARATUS

In addition to the usual laboratory apparatus, the following are also required.

2.1 Weighing Balance — shall have an accuracy to weigh 0.01 g.

2.2 Chronometer

2.3 Conditioning Chamber — shall have a device to adjust the temperature and humidity.

2.4 Static Load Press — shall have flat parallel plates of dimensions greater than those of the test pieces and shall be equipped with the following.

2.4.1 *Cylindrical Indenter* — shall be made of steel having 28.2 mm diameter (625 mm^2 surface area). It shall be fitted on a movable head.

2.4.2 *Dial Micrometer* — shall have an accuracy to measure 0.01 mm.

2.4.3 *Dead Weights* — for adjusting the load applied by the mobile head.

2.5 Vernier Gauge — shall have an accuracy to measure 0.1 mm.

2.6 Tensile Testing Machine — shall have an accuracy of 1 N, with one fixed jaw and other mobile jaw, 12 mm apart. The mobile jaw shall move at a speed of 300 mm per minute when unloaded.

2.7 Open Containers — for water and test fluids.

2.8 Metal Ruler — shall be graduated to 0.5 mm.

2.9 Cutting Dies — for cutting the samples for testing.

2.10 Mandrels — shall be of various diameters as required.

3 REAGENTS

3.1 Reference Fuel — 65 percent alkylate iso-octane, 35 percent toluene.

4 TEST PIECES

4.1 Preparation of the Test Pieces

4.1.1 *For Dimensional Change and Flexibility Tests*

The test pieces shall be cut from different positions in the sample with the help of cutting dies (*see* **2.9**), two in the longitudinal direction and two in the transverse direction.

4.1.2 *For Other Tests*

The test pieces to be tested shall be cut from each sheet or slab with the help of cutting dies (*see* **2.9**) at the edges and in the middle of the sample.

4.1.3 The dimensions and quantity of test pieces shall be in accordance with Table 1.

4.2 Conditioning

4.2.1 The test pieces shall be conditioned in the conditioning chamber (*see* **2.3**) for 24 h at 20 ± 2°C and 65 ± 5 percent relative humidity.

4.2.2 The tests shall be carried out at ambient temperature, on conditioned test pieces, unless otherwise specified.

5 TESTS

5.1 Thickness

5.1.1 If the thickness of the test piece is less than 10 mm, the press (*see* **2.4**), shall be used to determine the thickness. Place the test piece on the base-plate of the press (*see* **2.4**), and a pressure of 7 kPa shall be applied through the indenter (*see* **2.4.1**) at the centre for 15 s, and then read the thickness on the dial micrometer (*see* **2.4.2**).

5.1.2 If the thickness of the test piece is greater than 10 mm, then thickness shall be determined with the vernier gauge.

5.1.3 The thickness of the sample shall be the average of the results obtained for the nine test pieces tested. The result shall be expressed in millimetres rounded off to the nearest 0.1 mm.

Table 1 Dimensions and Number of Test Pieces

(*Clauses* 4.1.3 *and* 5.3.1)

Tests	Dimensions of Test Pieces (mm)	Number of Test Pieces	Remarks
Thickness	100 × 50	9	—
Apparent density	100 × 50	5	Use the test pieces used for the thickness test
Tensile strength	100 × 50	5	Use the test pieces used for the apparent density test
Compressibility and recovery	50 × 50 or Cylindrical having a cross-sectional area of 625 mm^2	3	*See* 5.4.1
Behaviour of fluids	50 × 50 or Cylindrical having a cross-sectional area of 625 mm^2	3 for each fluid	Use the test pieces used for the preceding test
Dimensional change	300 × 15	4	—
Flexibility	150 × 15	4	—

5.2 Apparent Density

5.2.1 *Procedure*

The length and the width of each test piece (*see* Table 1), shall be measured using ruler (*see* **2.8**), and weighed on the balance (*see* **2.1**).

5.2.2 *Expression of Results*

The apparent density of the sample, calculated by the given formula, shall be expressed in kg. m^{-3} :

$$\frac{m}{l \times b \times t} \times 10^6$$

where

m = mass of the test piece, in g, rounded off to the nearest 0.1 g;

l = length of the test piece, in mm, rounded off to the nearest integer;

b = width of the test piece, in mm, rounded off to the nearest integer; and

t = thickness of the piece, in mm, rounded off to the nearest 0.1 mm.

The apparent density of the sample shall be the average of the values obtained from each test piece. The result shall be rounded off to the nearest integer.

5.3 Tensile Strength

5.3.1 *Procedure*

Clamp each test piece (*see* Table 1) in the jaws of the machine (*see* **2.6**) so that the force is exerted in the longitudinal direction of the test piece. Set the machine in operation and record the force at which rupture occurs.

If the rupture occurs in or at the level of the jaws, test piece shall be discarded and repeat the test on a new test piece.

5.3.2 *Expression of Results*

The tensile strength of the test piece, calculated by the given formula shall be expressed in MPa:

$$\frac{F}{b \times t}$$

where

F = force at which rupture occurs, in N, rounded off to the nearest integer;

b = width of the test piece, in mm, rounded off to the nearest integer; and

t = thickness of the test piece, in mm, rounded off to the nearest 0.1 mm.

The tensile strength of the sample shall be the average of the values obtained from each test piece. The result shall be rounded off to the nearest 0.01 MPa.

5.4 Compressibility and Recovery

5.4.1 *Preparation of Test Pieces*

Take three test pieces, each test piece may be composed of one or several piled up units of the material in order to obtain a thickness between 4 mm and 6.5 mm.

5.4.2 *Procedure*

Each test piece (*see* **5.4.1**) shall be placed on the base plate of the press (*see* **2.4**). Apply load to obtain a pressure of 7 kPa for 15 s and immediately read thickness (t_1). Then increase load so that a pressure of 700 kPa is reached within 10 s and maintain this pressure for a further period of 60 s. Measure thickness (t_2) under this pressure. Remove the additional load and allow the test piece to recover at the initial pressure of 7 kPa for 60 s, and read thickness (t_3) under this load.

5.4.3 *Expression of Results*

The compressibility, calculated by the given formula, shall be expressed as a percentage :

$$\frac{t_1 - t_2}{t_1} \times 100$$

The recovery, calculated by the given formula, shall be expressed as a percentage:

$$\frac{t_3 - t_2}{t_1 - t_2} \times 100$$

where

t_1 = initial thickness at preload, in mm, rounded off to the nearest 0.01 mm;

t_2 = thickness under load, in mm, rounded off to the nearest 0.01 mm; and

t_3 = final thickness, in mm, rounded off to the nearest 0.01 mm.

The compressibility and the recovery of the test piece shall be the average of the values obtained from the three test pieces. The result shall be rounded off to the nearest integer.

5.5 Resistance to Boiling Water

5.5.1 *Procedure*

Place the test pieces (*see* Table 1) in the boiling water for 3 h. Remove the test pieces from water and make visual examination.

5.5.2 *Expression of Results*

The result of the test shall be expressed by stating the presence or absence of disintegration in the test pieces. (A test piece is said to disintegrate if it splits open and/or shows substantial loss of particles during the test.)

5.6 Resistance to Fuel

5.6.1 *Procedure*

Place the test pieces (*see* Table 1) in the reference fuel (*see* **3.1**) at ambient temperature for 24 h. Remove test pieces from fuel and make visual examination.

5.6.2 *Expression of Results*

The result of the test shall be expressed by stating the presence or absence of disintegration in the test pieces. (A test piece is said to disintegrate if it splits open and/or shows substantial loss of particles during the test.)

5.7 Dimensional Change

5.7.1 *Procedure*

Place the test pieces (*see* **4.1.1**) for 4 h in the conditioning chamber, controlled at a temperature of 50 ± 2°C and 95 ± 2 percent relative humidity. Allow to cool at 20 ± 2°C and 95 ± 2 percent relative humidity for 20 h in the chamber. Remove the test pieces and measure the length of the test pieces (l_1), using the rule (*see* **2.8**). Place for 24 h in the oven, controlled at 103 ± 2°C. Remove test pieces from oven and allow to cool in the desiccator for 24 h. Measure the length (l_2) of the test pieces, using the rule (*see* **2.8**).

5.7.2 *Expression of Results*

The dimensional change, expressed as a percentage, is given by the formula:

$$\frac{l_1 - l_2}{l_1} \times 100$$

where

l_1 = initial length of the test pieces, in mm, rounded off to the nearest integer; and

l_2 = final length of the test pieces, in mm, rounded off to the nearest integer.

The dimensional change shall be the average of the values obtained from each test piece. The result shall be rounded off to the nearest integer.

5.8 Flexibility

5.8.1 *Procedure*

Bend the test pieces (*see* **4.1.1**) through 180° round a mandrel of a diameter 5 times the thickness of the sample for materials up to 3 mm thick, or 7 times the thickness of the sample for materials over 3 mm thick.

5.8.2 *Expression of Results*

The result of the test shall be expressed by stating the presence or absence of breakage in the test pieces. (The absence of breakage shall imply no breakage throughout the granules of cork or separation of the granules.)

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